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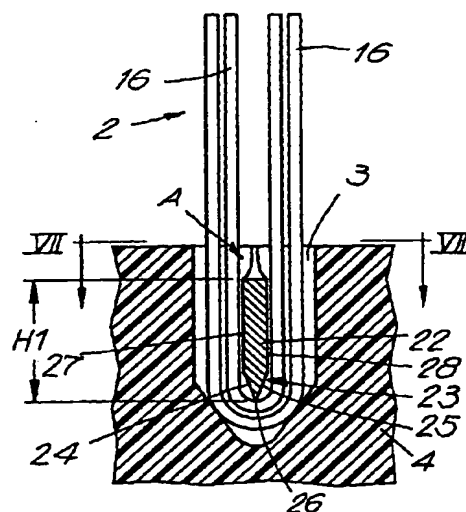
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(54) **Brush, as well as method and device for manufacturing such brush**

(57) The invention relates to a brush which comprises a brush body (4) which is provided with openings (3), as well as of fiber bundles (2) attached in these openings (3) by means of anchoring plates (22), with as a characteristic that this brush (19) comprises anchoring plates (22) which are provided with at least one portion (23) narrowing towards the underside. The invention also relates to a method and device for manufacturing such brush, whereby anchoring plates (22) are provided in the brush bodies which are provided with such narrowing portion (23).



*Fig. 6*

EP 1 088 495 A1

## Description

[0001] This invention relates to a brush, as well as to a method and a device for manufacturing such brush.

[0002] It is known that, when manufacturing brushes, the fiber bundles forming the brush hair can be fixed in the brush body either by means of staples or by means of anchoring plates. The present invention relates to brushes of the last-mentioned type, in other words, wherein the fixation of the fiber bundles is performed by means of anchoring plates. The aim of the invention consists in providing an improved brush of this type.

[0003] To this aim, the invention in the first place relates to a brush comprising a brush body which is provided with openings, as well as with fiber bundles fixed in these openings by means of anchoring plates, with as a characteristic that this brush comprises anchoring plates which are provided with at least one portion narrowing towards the underside.

[0004] As the anchoring plates are provided with a portion narrowing towards the underside, various advantages are obtained.

[0005] A first advantage consists in that they can be brought into the pertaining openings in an easier manner.

[0006] A second advantage consists in that during the penetration of the anchoring plates into the material of the brush body, the risk of forming chips or wire edges is excluded, if not the formation thereof is minimized. As a consequence thereof, it is avoided that material particles of the brush body get into the openings and between the brush fibers which, up to the present, forms a problem with the known embodiments, as such material particles can hamper the correct position of the brush fibers and/or anchoring plates, which may result in a faulty implantation of the fiber bundles; in respect to the positioning of the fibers as well as to the quality of the fixation.

[0007] A third advantage of the invention consists in that the material of the brush body, in any case if the latter consists of a relatively flexible material, such as synthetic material, is not scraped away during the penetration of the anchoring plates, but is pushed side-ward in order to, so to speak, close again behind the anchoring plate, as a result of which the anchoring plate is prevented to move back, which provides in a better fixation of the anchoring plate in the respective opening and therefore also in a better fixation of the fiber bundles.

[0008] A fourth advantage of the invention consists in that the risk of the occurrence of cracks and fractures in the brush body as a result of the application of the anchoring plates is minimized.

[0009] It is obvious that the tapering portion preferably is realized in such a manner that the creation of chips and/or wire edges during the penetration of the anchoring plate is avoided.

[0010] More particularly, it is preferred that the tapering portion is realized such that a cutting effect of the anchoring plate during penetration is obtained.

[0011] In practice, such portion will be formed by one or more inclined portions, preferably at the location of the bottom edge of such anchoring plate, in other words, the edge of the anchoring plate which is directed towards the bottom of the pertaining opening.

[0012] In a preferred form of embodiment, the tapering portion is formed in that the respective anchoring plates; at least at one of the two major lateral surfaces, are provided with at least one deformation, more particularly an inclined portion or such.

[0013] In the most preferred form of embodiment, an inclined portion is provided at both major lateral surfaces of such anchoring plate, which inclined portions come together at the bottom edge of the anchoring plate.

[0014] According to a variant, it is, however, not excluded to provide such deformations, more particularly inclined portions, at the narrow faces of the anchoring plate, or to provide in a combination of inclined portions at the major lateral surfaces as well as at the narrow faces.

[0015] Further, it is also always preferred that such tapering portion, and more particularly the inclined portion, is realized such that the anchoring plate, at least at the locations where it comes into contact with the material of which the brush body is made, tapers to a point.

[0016] Possibly, the bottom edge of the anchoring plate, or anyhow at least the portion of the bottom edge coming into contact with the fiber bundles, can be realized such that it is free of acute edges; to which end the bottom edge, for example, can be rounded or flattened. As a result thereof, it is excluded that the fiber bundles are damaged by the insertion of the anchoring plates.

[0017] In a preferred form of embodiment, the anchoring plate is provided at the upper side, either at one or both of the longitudinal edges, or at one or both of the narrow edges, or at the longitudinal as well as the narrow edges, with a design counteracting the forcing back of the anchoring plate. To this aim, the anchoring plate can be provided with a classical flat upper side. However, in order to increase the intended effect, the anchoring plate can be provided at the upper side with one or more edge portions showing in cross-section an acute angle, in other words, an angle which is smaller than 90°.

[0018] The invention also relates to a method for manufacturing such brush, whereby the brush hair is implanted into a brush body by placing fiber bundles by means of a filling tool into openings in the brush body and fixing them by means of anchoring plates, with as a characteristic that anchoring plates are applied which, at the edge with which they are pressed into the aforementioned openings, are provided with a narrowed portion, more particularly an inclined portion.

[0019] Depending on the shape of the desired

anchoring plates, the aforementioned method either or not can be realized on a classical device for manufacturing brushes. According to the first possibility, for realizing the anchoring plates, one starts with a wire supply with wire in which the aforementioned narrowed portion already is provided. According to the second possibility, the narrowing portion is formed partially or completely at the location of the brush manufacturing machine itself.

**[0020]** The invention thus also relates to a device for manufacturing brushes which is composed of at least a filling tool; means for positioning brush bodies and the filling tool opposite each other; means for supplying fiber bundles to the filling tool; and means for supplying wire to the filling tool in order to form anchoring plates therefrom, with as a characteristic that this device is also equipped with means for providing a narrowing portion, more particularly one or more inclined portions, at the wire and/or the anchoring plates.

**[0021]** With the intention of better showing the characteristics of the invention, hereafter, as an example without any limitative character, several preferred forms of embodiment are described, with reference to the accompanying drawings, wherein:

figure 1 represents a known device for attaching fiber bundles in brush bodies by means of anchoring plates;

figure 2 schematically represents an anchoring plate of known shape, together with a fiber bundle; figure 3 schematically represents the fiber bundle from figure 2, after the latter has been placed in an opening in a brush body;

figure 4 represents a cross-section according to line IV-IV in figure 3;

figure 5 in perspective represents an anchoring plate, as it is applied in a brush according to the invention;

figure 6 represents a portion of a brush according to the invention, whereby an anchoring plate, as represented in figure 5, is applied;

figure 7 represents a cross-section according to line VII-VII in figure 6;

figures 8 and 9 schematically represent how the fiber bundle from figure 6 is provided in the brush body;

figures 10 to 12 represent another number of variants of anchoring plates for the realization of brushes according to the invention;

figure 13 represents a view according to arrow F13 in figure 12;

figure 14 represents another anchoring plate;

figure 15 represents a view according to arrow F15 in figure 14;

figures 16 to 18 represent another three anchoring plates according to the invention;

figures 19 to 21 in perspective represent another three variants of anchoring plates according to the

invention;

figure 22 represents a cross-section according to line XXII-XXII in figure 18, whereby the anchoring plate is clamped into a brush body;

figure 23, at a larger scale, represents a cross-section according to line XXIII-XXIII in figure 1, however, for an embodiment according to the invention; figure 24 very schematically represents another portion of a device according to the invention.

**[0022]** In order to better situate the invention, in figure 1 schematically a known device 1 is represented which allows to attach fiber bundles 2 in openings 3 in brush bodies 4, such by means of anchoring plates 5, as represented in figure 2.

**[0023]** This device 1 comprises a filling tool 6; means 7 for positioning brush bodies 4 and the filling tool 6 opposite each other; means 8 for supplying fiber bundles 2 to the filling tool 6; and means 9 for supplying a wire 10 to the filling tool 6 in order to form anchoring plates 5 therefrom.

**[0024]** The filling tool 6 comprises a guide 11 by means of which a fiber bundle 2, by means of an anchoring plate 5, can be pressed into an opening 3, such by means of a rod 12 moving to and fro.

**[0025]** The means 8 for supplying fiber bundles 2 to the filling tool 6 consist of a to-and-fro rotating bundle-take up device 13 which is provided with a recess 14 cooperating with at least one fiber magazine 15 in which a quantity of loose fibers 16 is provided, in such a manner that in every cycle of the fiber bundle-take up device 13, a quantity of fibers 16 is taken up in the recess 14 and is brought into the prolongation of the guide 11.

**[0026]** The aforementioned means 9 consist of a spool 17 with wire 10 which is supplied to the filling tool 6, from which wire 10 the anchoring plates 5 are cut off by means of the rod 12.

**[0027]** The means 7 for positioning the brush bodies 4 and the filling tool 6 opposite each other can be of any kind. In the represented example, they consist of a movable brush body holder 18.

**[0028]** Such device 1 is known in itself and therefore will not be further described in detail.

**[0029]** The method followed herein for manufacturing the brushes 19 consists in that the brush bodies 4, one after the other, are presented with their openings 3 in front of the filling tool 6, and that each time, by means of the bundle-take up device 13, a fiber bundle 2 is brought into the prolongation of the guide 11. By moving the rod 12 to and fro, a piece of material is cut off from the extremity of the wire 10, which then forms the anchoring plate 5, and the fiber bundle 2 is taken along with the movement of the anchoring plate 5 out of the recess 20 up into the brush body 4.

**[0030]** In that the known anchoring plates 5 have a prismatically rectangular shape, such as represented in figure 2, during implantation in the brush body 4 an effect is created, as represented schematically in fig-

ures 3 and 4, according to which material particles 21, in the form of chips or such, are formed. The presence of such material particles 21 may disturb the good positioning of the fibers 16, as well as of the anchoring plates 5, as explained in the introduction. A number of fibers 16, for example, as represented in figure 3, may become skew, as a result of which the brush hair obtain a "drifted" appearance.

[0031] According to the present invention, this is remedied, or the aforementioned effect at least is minimized, by making use of anchoring plates 22 which are provided with at least one portion 23 narrowing towards the bottom side, in such a manner that the anchoring plates 22 can penetrate into the openings 3 more easily, without thereby creating a chipping effect.

[0032] According to the embodiments of figures 5 to 9, the anchoring plate 22 is provided with a narrowing portion 23 in that inclined portions 24-25 are provided at opposite sides of the bottom edge 26, in this case, at the major lateral surfaces 27-28. By "bottom edge", according to the invention the edge of the anchoring plate 22 has to be understood which is directed towards the bottom of the respective opening 3.

[0033] The inclined portions 24-25 extend over the entire length of the bottom edge 26 and render the anchoring plate 22 in cross-section tapering to a point.

[0034] By means of the aforementioned inclined portions 24-25, it is obtained that the anchoring plate 22 at the bottom, so to speak, cuts its way through the material, whereas at the opposite extremities 29-30 still a good clamping effect remains guaranteed. As a result of the guiding effect of the narrowing portion 23, and in this case also the cutting effect of the bottom edge 26, it is obtained that the forming of material particles 21 is excluded, or at least minimized. Moreover, it is obtained that the material of the brush body 4, as indicated by arrows A in figures 6, 7, and 9, so to speak, closes again behind the anchoring plate 22, as a result of which a locking effect is obtained.

[0035] The aforementioned narrowing portion 23 can be realized in different ways. A number of variants thereof is represented in figures 10 to 22.

[0036] Figure 10 shows an anchoring plate 22 whereby the narrowing portion 23 is formed by an inclined portion 24 on one side.

[0037] According to figure 11, the inclined portions 24 and 25 extend over the entire height of the anchoring plate 22, which means that the aforementioned portion 23 in fact consists of the entire anchoring plate 22.

[0038] As represented in figures 5 to 11, the inclined portions do not necessarily have to be realized at the lateral surfaces 27-28, but may also be provided at the narrow sides 31-32, as indicated by references 33 and 34 in figures 12 and 13.

[0039] Figures 14 and 15 show a combination in which inclined portions 24 and 25, as well as 33 and 34 are applied.

[0040] The narrowing portion 23 can be realized by

any shape alteration. By the term "narrowing", according to the invention any alteration of shape in the cross-section of the anchoring plate 22 which contributes to the exclusion of the creation of material particles 21 and/or contributes to that the anchoring plate 22 can be brought more optimally into the pertaining opening 3. As represented in figures 16 and 19, it then also is not excluded to let the anchoring plate 22 taper in the proximity of its bottom edge 26 by providing it at the bottom side with one or more roundings 35-36.

[0041] Figure 17 shows another variant, whereby the narrowing portion 23 is situated at a distance from the bottom edge 26. Hereby, the anchoring plate 22 consists of a bottom part with a width B1 which preferably is smaller than the diameter of the opening 3, and of a top part with a width B2 which is larger than the aforementioned diameter.

[0042] In figures 18, 19 and 20, anchoring plates 22 are represented, the bottom edge of which does not show an acute edge, so as to prevent that the anchoring plate 22, when being inserted into the brush body 4, damages the fiber bundles 2. To this end, in a first possibility, the bottom edge 26 is flattened, at least that portion coming into contact with the fiber bundles 2, or, in a second possibility, this bottom edge 26 is rounded, as represented in figures 19 and 20.

[0043] According to a particular aspect of the invention, the anchoring plate 22 at its upper side is provided with a design which counteracts the forcing back of this anchoring plate 22. More particularly, such anchoring plate 22 to this end, as represented in figures 21 and 22, will be provided with one or more edge portions 37 which, in cross-section, define an acute angle, in other words, an angle H which is smaller than 90°, and even better is smaller than 45°.

[0044] It is obvious that the invention relates to brushes 19, the fiber bundles 2 of which are attached by means of such anchoring plates 22, as well as to such anchoring plates 22 themselves. Of course, the invention is not restricted to tooth brushes but can be applied to any kind of brush 19.

[0045] According to the invention, the manufacturing of brushes 19 can take place by means of a device known in itself, more particularly a device 1 as has been described by means of figure 1. According to the process of the invention, hereby, then, anchoring plates 22 are applied which, as aforementioned, are provided with a narrowing portion 23.

[0046] Preferably, to this end to the entry of the filling tool 6, a wire 10 is supplied, at which the aforementioned narrowing portion 23 already is formed, for example, by supplying a wire 10 to this entry which wire has a cross-section as represented in figure 23.

[0047] More particularly, it is preferred that to this end, one starts with a spool 17 with wire 10 having an adapted design, in other words, at which the narrowing portion 23 has been provided already during the manufacturing of the wire.

[0048] According to a particular method of the invention, one starts with a wire supply, more particular a wire 10 wound up in the shape of a spool 17, and the wire 10 is deformed during its feeding from this wire supply towards the filling tool 6 in order to create the  
5  
aforementioned narrowing portion 23, for example, such as represented schematically in figure 24, according to which a wire 10 with a rectangular cross-section is re-  
10  
shaped to a wire with a cross-section according to figure 23. To this end, between the spool 17 and the filling tool 6 means 38 are provided for providing a narrowed portion, more particular an inclined portion 24-25 at the wire 10. These means 38 can be of any kind and may, for example, consist of a rolling device or similar.

[0049] Basically, it is also not excluded to form the aforementioned narrowing portion 23 at the wire 10 and/or the already cut-off anchoring plates 22 in the filling tool 6. So, for example, the inclined portions 33 and 34 can be realized by providing in the filling tool 6 for a flattening of the edges of the anchoring plates 22.  
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[0050] It is also not excluded to supply loose anchoring plates 22 instead of forming them on location.

[0051] Finally, it is noted that forms of embodiment whereby the vertical cross-section is uniform over the entire length of the anchoring plate 22, are preferred, as such anchoring plates 22 can easily be realized by starting with a wire 10 with an appropriate shape, without having to perform a shape alteration when manufacturing the brushes 19. The narrow sides 31 and 32 then also remain parallel over their entire height, as a result of which at least the same clamping height H1 remains maintained as with classical anchoring plates 5.  
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[0052] It is also noted that owing to the invention, the classical anchoring plates made of metal possibly can be replaced by anchoring plates made of synthetic material. As the force required to drive plates according to the invention into the brush body is smaller than with classical rectangular plates, in fact plates of a material which is less solid than metal can be applied, which was a problem up to the present.  
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[0053] The present invention is in no way limited to the forms of embodiment described as an example and represented in the figures, on the contrary may such brush, as well as the method and device for the manufacture thereof, be realized according to different variants, without leaving the scope of the invention.  
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#### Claims

1. Brush, comprising a brush body (4) which is provided with openings (3), as well as of fiber bundles (2) attached in these openings (3) by means of anchoring plates (22), characterized in that this brush (19) comprises anchoring plates (22) which are provided with at least one portion (23) narrowing towards the underside.  
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2. Brush according to claim 1, characterized in that the narrowing portion (23) is made such that the creation of chips and/or wire edges during the insertion of the anchoring plate (22) is prevented.
3. Brush according to claim 1 or 2, characterized in that the narrowing portion (23) is made such that a cutting effect of the anchoring plate (22) in the material of the brush body (4) is obtained.
4. Brush according to any of the preceding claims, characterized in that the narrowing portion (23) is formed by one or more inclined portions (24-25-33-34).
5. Brush according to claim 4, characterized in that the narrowing portion (23) is formed in that the anchoring plates (22) concerned, at least at one of the two major lateral surfaces (27-28), are provided with at least one deformation, more particularly an inclined portion (24-25).
6. Brush according to claim 5, characterized in that at both major lateral surfaces (27-28), an inclined portion (24-25) is provided, which inclined portions (24-25) are coming together at the bottom edge (26) of the anchoring plate (22), thereby forming a pointed edge.
7. Brush according to any of the preceding claims, characterized in that the aforementioned narrowing portion (23), more particularly the aforementioned inclined portion (24-25), extends along the entire bottom edge (26).
8. Brush according to claim 4, characterized in that the narrowing portion (23) is formed in that the anchoring plates (22) concerned, at least at one of the narrow sides (31-32), are provided with at least one deformation, more particularly an inclined portion (33-34).
9. Brush according to any of the preceding claims, characterized in that the narrowing portion (23) is realized such that the anchoring plate (22), at least at the locations where it comes into contact with the material from which the brush body (4) is made, tapers to a pointed end.
- 50 10. Brush according to any of the preceding claims, characterized in that the anchoring plate (22) at the upper side, either at one or both of the longitudinal edges, or at one or both of the narrow edges, or at longitudinal as well as the narrow edges, shows a design which counteracts the forcing back of the anchoring plate (22).
11. Brush according to claim 10, characterized in that

the anchoring plate (22) shows at its upper side one or more edge portions (37) showing in cross-section an acute angle (H), in other words, an angle (H) which is smaller than 90°.

12. Brush according to claim 11, characterized in that the aforementioned angle (H) is smaller than 45°.

13. Brush according to any of the preceding claims, characterized in that at least the portion of the bottom edge (26) of the anchoring plate (22) which comes into contact with the fiber bundles (2), is free of sharp edges, more particularly, is rounded or flattened to this aim.

14. Brush according to any of the preceding claims, characterized in that the anchoring plates (22) consist of synthetic material.

15. Method for manufacturing a brush, more particularly a brush (19) according to any of the preceding claims, whereby the brush hairs are implanted into a brush body (4) by placing fiber bundles (2) by means of a filling tool (6) into openings in the brush body (4) and to attach them by means of anchoring plates (22), characterized in that anchoring plates (22) are applied which are provided with a portion (23) narrowing towards the underside.

16. Method according to claim 15, characterized in that the anchoring plates (22) are formed of a wire (10) supplied to the filling tool (6), which wire, when being supplied to this filling tool (6), already is provided with the aforementioned narrowing portion (23), more particularly the aforementioned inclined portion (24-25).

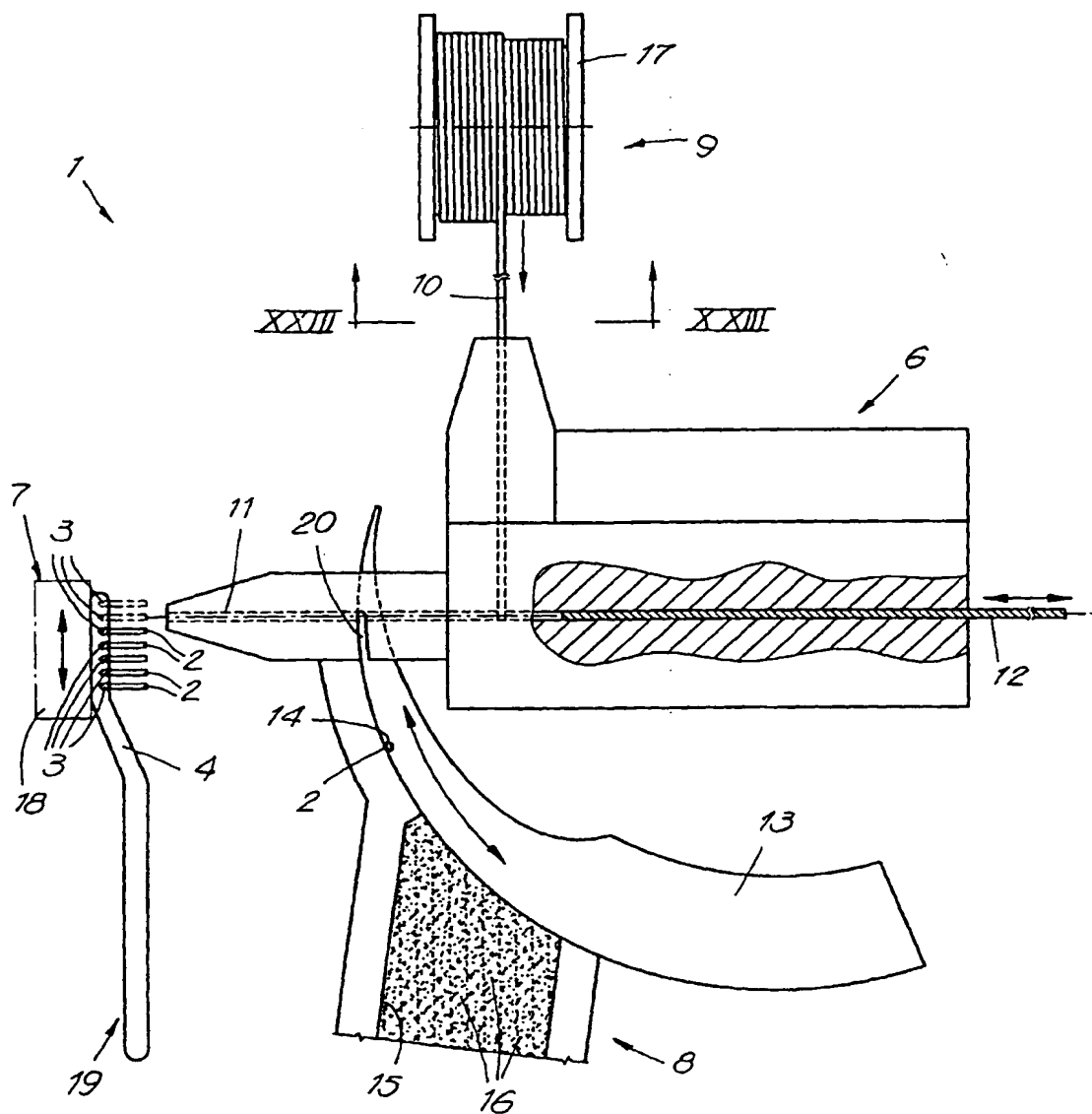
17. Method according to claim 16, characterized in that one starts with a wire supply, more particularly a spool (17), with wire (10) at which the aforementioned narrowing portion (23) is already present.

18. Method according to claim 16, characterized in that one starts with a wire supply, more particularly a wire (10) which is rolled up in the shape of a spool (17), and that the wire (10) during its feeding from this wire supply to the filling tool (6) is deformed in order to form a narrowing portion (23), as mentioned before, thereon.

19. Device for manufacturing a brush, more particularly a brush according to any of the claims 1 to 14, which at least consists of a filling tool (6); means (7) for positioning brush bodies (4) and the filling tool (6) opposite to each other; means (8) for supplying fiber bundles (2) to the filling tool (6); and means (9) for supplying a wire (10) to the filling tool (5) in order to form anchoring plates (22) therefrom, character-

ized in that the device (1) comprises means (38) for forming a portion (23) narrowing towards the underside at the wire (10) and/or the anchoring plates (22).

20. Device according to claim 19, characterized in that the means (38) for forming a portion (23) narrowing towards the underside at the anchoring plates (22) consist of a processing unit which is provided in between the wire supply and the filling tool (6).



*Fig. 1*

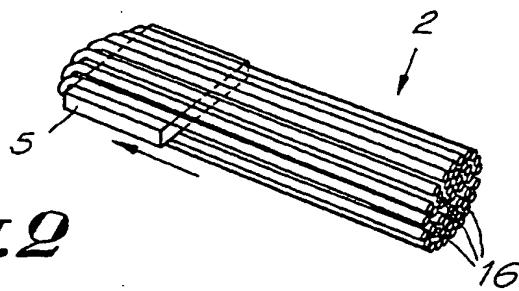
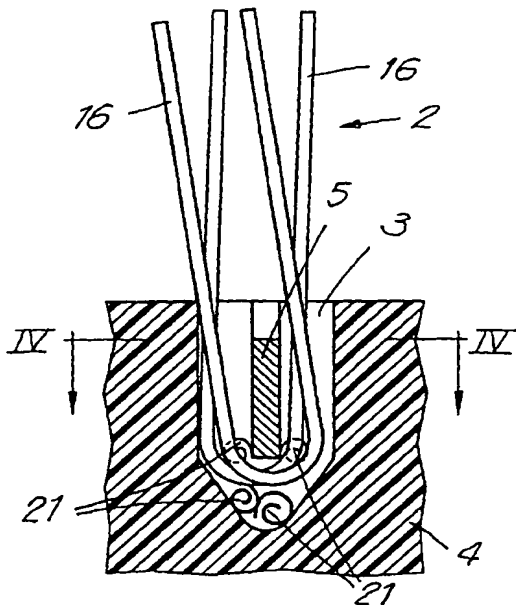
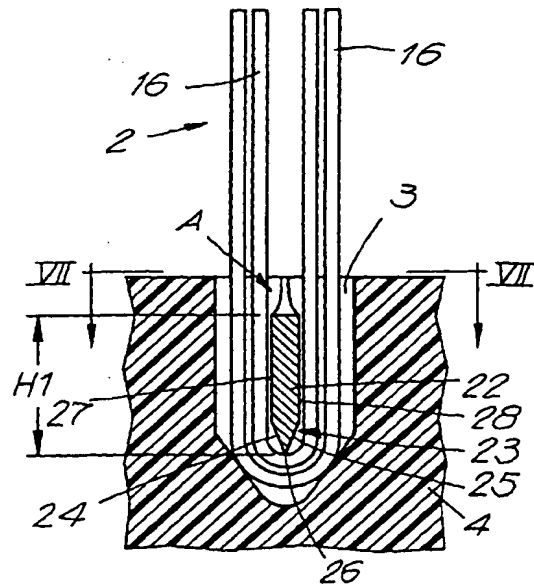


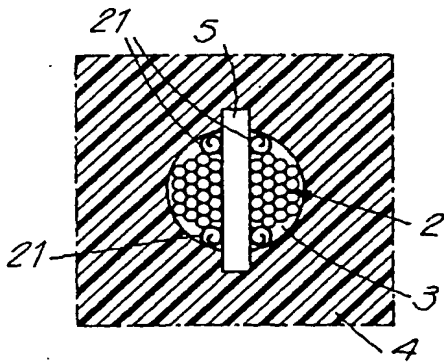
Fig. 2



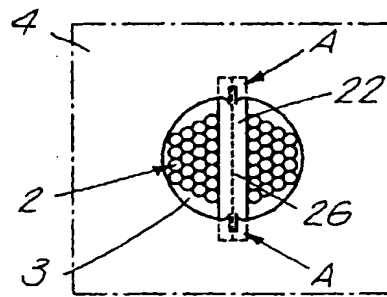
*Fig. 3*



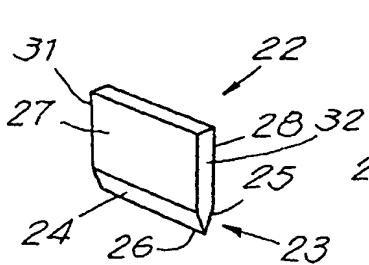
*Fig. 6*



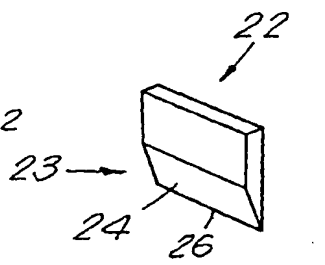
*Fig. 4*



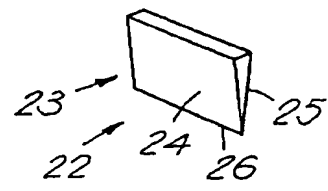
*Fig. 7*



*Fig. 5*

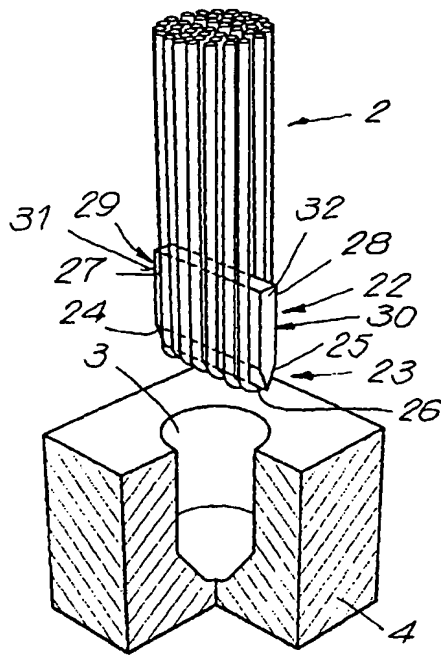


*Fig. 10*

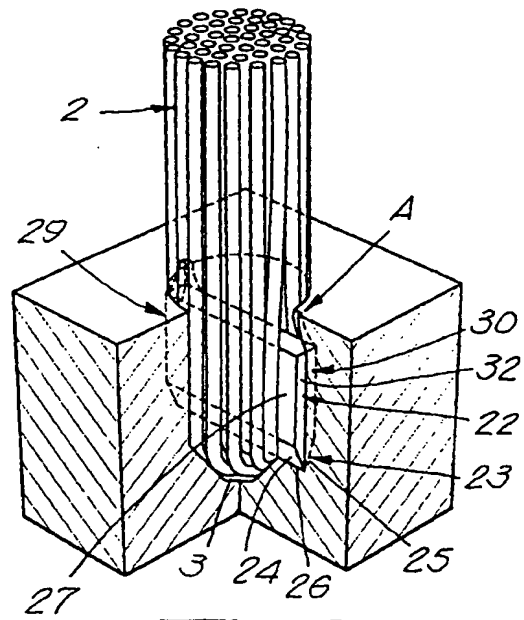


*Fig. 11*

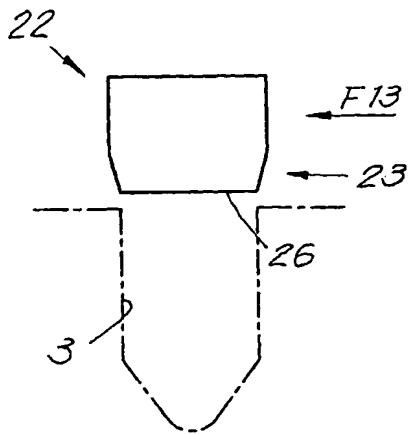




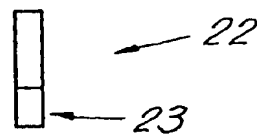
*Fig. 8*



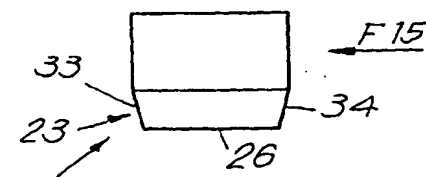
*Fig. 9*



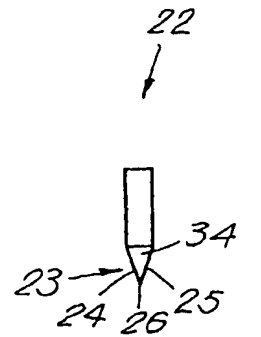
*Fig. 12*



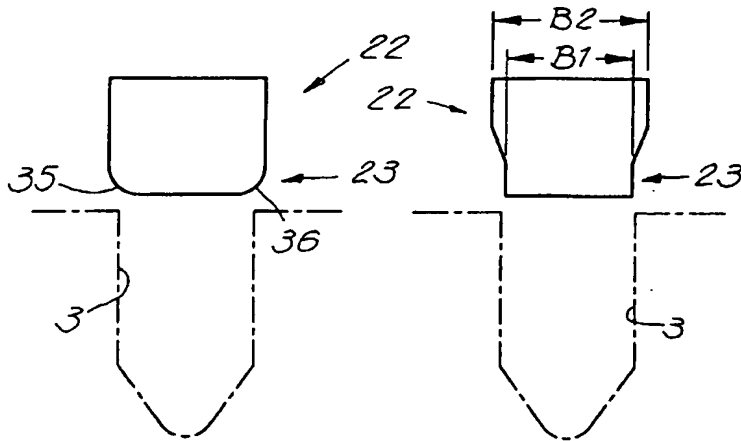
*Fig. 13*



*Fig. 14*

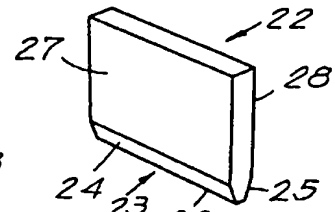


*Fig. 15*

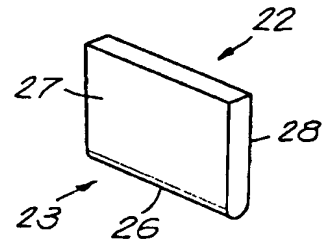


**Fig. 16**

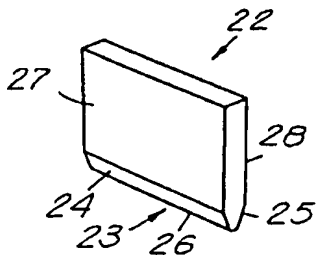
**Fig. 17**



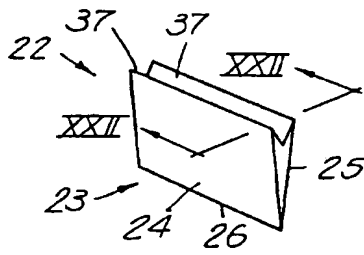
**Fig. 18**



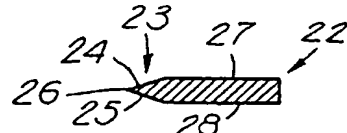
**Fig. 19**



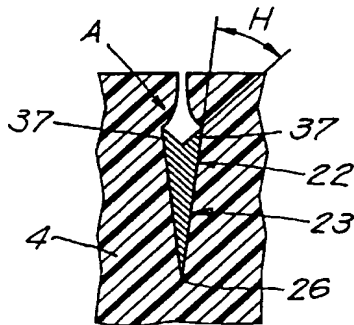
**Fig. 20**



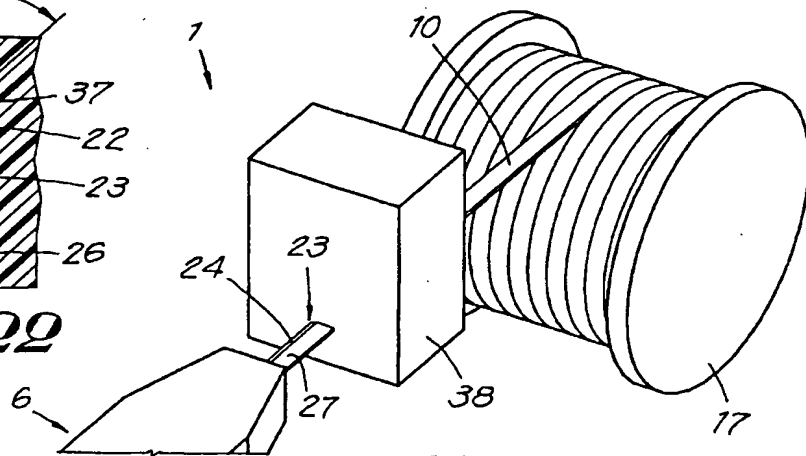
**Fig. 21**



**Fig. 23**



**Fig. 22**



**Fig. 24**



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## EUROPEAN SEARCH REPORT

Application Number  
EP 00 20 3118

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CL7)
A	EP 0 237 653 A (BOUCHERIE NV G B) 23 September 1987 (1987-09-23) * page 4, line 7 - page 9, line 6; figures *	1-20	A46B3/16 A46D3/04
A	DE 196 50 543 A (ZAHORANSKY RICHARD PROF DR ING) 10 June 1998 (1998-06-10) * column 2, line 8 - column 4, line 46; figures *	15-20	
A	DE 44 18 854 A (ZAHORANSKY ANTON GMBH & CO) 7 December 1995 (1995-12-07) * column 4, line 33 - column 6, line 22; figures *	1-18	
A	DE 195 19 291 A (ZAHORANSKY ANTON GMBH & CO) 28 November 1996 (1996-11-28) * column 2, line 56 - column 4, line 51; figures *	1-18	
A	US 5 724 697 A (KLEE MARTIN HOWARD ET AL) 10 March 1998 (1998-03-10) * column 2, line 47 - column 4, line 17; figures *	1-18	TECHNICAL FIELDS SEARCHED (Int.CL7)  A46B A46D
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>18 October 2000</b>	Examiner <b>Triantaphillou, P</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 20 3118

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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18-10-2000

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82